

Amendments to the Specification

Please replace paragraph [0002] with the following amendment paragraph:

[0002] In many production facilities, several buildings are located about a campus which includes a central utility plant (hereinafter denoted CUP) having gas/oil fired boilers and large, electrically powered pumps for providing, when outside temperatures require, space heating to the fabrication buildings and possibly to office and other buildings as well. In typical systems, the buildings are heated by hot water heaters or radiators, the water being heated by circulating through one flow path of a heat exchanger with boiler-heated water circulating through the other flow path. In the event of a power outage, i.e., a cessation of electrical power received by the equipment at the CUP which relies upon such power for supplying heat, back-up means must be provided for supplying at least some of the necessary space heating. Such back-up means commonly takes the form of a gasoline or diesel fueled engine which drives a generator at the CUP to provide the electricity used to power pumps and other emergency equipment to circulate heated water to the areas requiring heat building heat exchangers.

Please replace paragraph [0003] with the following amendment paragraph:

[0003] Building codes commonly require that buildings containing semiconductor fabrication equipment have an air exhaust system, with the consequent necessity of taking in outside air in a quantity sufficient to replace the exhaust air. The exhaust fans and intake air handing systems are also electrically powered, with a separate motor/generator provided in each building to supply the required power during periods of primary electrical supply outages. Upon the

occurrence of a power outage, both the exhaust and make-up air handling systems are, in typical systems, ramped down to 50% of their flow under normal conditions, thereby satisfying code requirements. However, regardless of the degree of thermal integrity (insulation) of the building, significant amounts of outside air, which may be very cold, must still enter the building on a continuous basis. Although the motor/generator at the CUP will supply electricity to power pumps sufficient to circulate hot water to provide enough heat to the incoming air as to prevent the temperature in fabrication areas from reaching the freezing mark, the temperature may fall to a point, or the rate of temperature change may be so rapid, as to cause permanent damage to elements of the production equipment, such as lenses of photolithography equipment used in semiconductor fabrication. When this occurs, not only is there the expense of purchasing and installing new components to replace those damaged, but the much greater expense of lost production time while the equipment is out of service.

Please replace paragraph [0010] with the following amendment paragraph:

[0010] In the system of the present invention, a second heat exchanger, having two, mutually exclusive, liquid flow paths, is provided in each fabrication building, in addition to the conventional equipment heat exchanger mentioned earlier. During periods of primary power outage when outside temperature is below the value requiring heating of the fabrication buildings, liquid coolant from the motor/generator in the fabrication building is diverted, through operation of a three-way valve, from the radiator to one of the flow paths through the second heat exchanger. The heating water supply from the CUP passes through one flow path of the conventional heating system (space heater) (first) heat exchanger in the fabrication building, and

is then transferring heat to the water circulating through the other flow path and the heater.

Rather than circulating directly from the heater back to the first heat exchanger, the heated water
is diverted, through operation of a second three-way valve and booster pump, through the other
flow path of the second heat exchanger to receive heat from the engine coolant therein, then
passing again through the heating system, thereby providing additional heat to the area
containing the production tooling. Preferably, the space heaters are located in the intake of the
make-up air which is introduced from the outside to compensate for air which is exhausted from
the production equipment. This augmentation of the temperature in the fabrication areas serves to
prevent damage which could otherwise be incurred by equipment which is sensitive to rapid
temperature changes.

Please replace paragraph [0012] with the following amendment paragraph:

[0012] Figure 1 is a diagrammatic illustration of a manufacturing facility comprising multiple buildings and illustrating the flow of water for heating purposes to the various buildings, as well as the flow of electricity from both primary and secondary supplies to electrically powered equipment; and

Please replace paragraph [0013] with the following amendment paragraph:

[0013] Figure 2 is a diagrammatic, front elevation of one of the buildings of Figure 1 [[; and]].

Please delete paragraph [0014].

Please replace paragraph [0016] with the following amendment paragraph:

[0016] In Figure 1, block 10 represents a central utility plant (CUP), i.e., a building containing, among other things, the apparatus for supplying heat, in the form of hot water, to office building 12 and semiconductor fabrication buildings 14 and 16. A plurality of boiler systems 18 each include a fluid fired boiler and large, circulation pump receiving electrical power from a remote, commercial supply 20 over line 22. Water is heated in boiler systems 18 to a predetermined temperature and is circulated by the pumps through hot water supply line 24 and is supplied through lines 26, 28, and 30 to a first flow path of each of conventional hot water radiation heaters heat exchangers 32, 34 and 36 within buildings 12, 14 and 16, respectively, through lines 26, 28, and 30. After transferring heat to the air water within the buildings second flow path of heat exchangers 32, 34 and 36, the boiler-heated water is returned through lines 38, 40 and 42 from buildings 12, 14 and 16, respectively, to return line 44 and thence to boiler systems 18 for re-heating. Water receiving heat from exchangers 32, 34 and 36 is circulated to space heaters 33, 35 and 37, respectively.

Please replace paragraph [0017] with the following amendment paragraph:

[0017] Figure 2 diagrammatically illustrates, in front elevation, a semiconductor fabrication building 14 having structural features to which buildings 14 and 16 conform and other elements in common with building 16. The building is divided by solid barrier 46 into upper and lower compartments 48 and 50, respectively. Fabrication of semiconductor components, chips,

circuits, and the like, is performed, at least partially, by production tools, denoted generally by reference numerals 52 and 54, in lower compartment 50. Tools 52 and 54 are of a conventional form which includes components, e.g., lenses used in photolithography equipment, which are subject to damage or destruction when subjected to low and/or rapidly changing temperatures. Such equipment requires an exhaust system and a constant supply of fresh, clean air to replace that which is exhausted. In the illustrated system, air is exhausted from tools 52 and 54 through ducts 56 and 58, respectively, and is moved by exhaust fans or blowers within enclosure 60, which may also contain any necessary air treatment equipment, in upper compartment 48 to outside atmosphere. The exhaust fans are driven by an electric motor, indicated by the block numbered 62, powered by electricity from source 20 through line 64.

Please replace paragraph [0018] with the following amendment paragraph:

[0018] An amount of air substantially equal to that exhausted from the building must be taken in from outside atmosphere. This is accomplished by providing air intake openings through which atmospheric air, indicated by arrows 66, is passed to air treatment enclosure 68 in upper compartment 48. Intake fans within enclosure 68 are powered by an electric motor 70 powered by electricity from source 20 on line 71. When heating is required, the air passing through enclosure 68 is heated by the previously mentioned hot water heater, ~~the heater shown in Figure 2 being numbered 34, 36 to indicate that it is the same as the heaters so numbered in Figure 1 for buildings 14 and 16, respectively. Also, the lines through which heating water is carried to and from heaters 34, 36 are numbered 40, 42, respectively, 35. The line through which water is supplied from boiler system 18 to heat exchanger 34 is numbered 28, and the return line 40.~~

corresponding to their numbering in Figure 1. Essentially all particulate matter down to sub-micron size is removed by filters in enclosure 68 and the air is heated by the hot water heater 35 before being delivered to plenum 72 in the upper part of lower compartment 50, as indicated by arrows 74. Air from plenum 72 passes vertically downward, in laminar fashion, into lower compartment 50, as shown by the arrows numbered 76, and maintains both the pressure and temperature therein within a desired range.

Please replace paragraph [0020] with the following amendment paragraph:

[0020] [[The]] Common reference numerals are used in Figure 2 to denote the ~~exhaust and intake fans and the lines through which they receive electricity from source 20, i.e., numerals 62, 70, 64 and 71, are used in Figure 1 to denote the same~~ elements in building 14 which are also shown in Figure 1, while the corresponding elements in building 16 are noted by the same reference numerals with a prime sign ('') added. Engine/generators 82, 82' are provided in buildings 14 and 16, respectively, to provide the electricity necessary to operate motors 62, 62' and 70, 70' in the event of power failure at source 20. Electricity to motors 62, 62' is provided on lines 84, 84', respectively, and that for motors 70, 70' is provided on lines 86, 86', respectively. Liquid coolant used in engine/generators 82, 82' is normally circulated to conventional radiators and the heat rejected to outside air before return to the respective engine/generator. The outdoor radiators for engine/generators 82, 82' are shown in Figure 1, denoted by reference numerals 88, 88', respectively.

Please replace paragraph [0022] with the following amendment paragraph:

[0022] ~~The essence~~ Structural and operational features of the present invention ~~may be seen are~~ explained below with reference to building 14, as shown in Figure 3 Figure 2, and portions of Figure 1. Engine/generator 82 includes a conventional liquid cooling system. Coolant leaves ~~leaving~~ the engine ~~through line 90 and~~, when outside temperatures are above a predetermined value, ~~passes through~~ is directed by 3-way valve [[92]] 90 to line 92 and thence to outside radiator 88 where heat is rejected to outside air, and returns to the engine through lines 94 and 96. When the outside temperature is below the predetermined value, valve 92 is switched to direct coolant ~~from line 90 through line 98 to~~ one flow path of heat exchanger 100. After passing through heat exchanger 100 the coolant is returned to the engine via lines 102 and 96. ~~Heat exchanger 100 is also connected to supply and return heating water lines 28 and 40,~~ ~~respectively, through lines 104 and 106.~~ A second 3-way valve 104 is positioned in the line between space heater 35 and heat exchanger 34. During periods of primary outage and low outside temperatures, valve 104 is actuated to direct water from heater 35 through line 106 to the other flow path of heat exchanger 100, where it receives heat from the engine coolant before circulating through line 108 to heat exchanger 34. Also, ~~an additional 3-way valve 108 and booster pump 110~~ [[are]] is provided in line 106.

Please replace paragraph [0023] with the following amendment paragraph:

[0023] When outside temperature is high enough that auxiliary heat is not required during a power outage, engine/generator 82 (and 82') operates to provide, electricity for operating the

intake and exhaust air systems, and possibly to maintain production equipment in a stand-by mode, with engine coolant directed to and from the outdoor radiator(s). When outside air temperature is below the point where heat must be provided, engine/generator 78 is operated to power the pump circulating heated water from its associated boiler system 18, and both of valves [[92]] 90 and [[108]] 104, together with booster pump 110 are actuated. This causes heating water which has passed through heater [[34]] 35 and rejected some heat to the air coming into building 14 to circulate to heat exchanger 100 where it is reheated to some extent by engine coolant passing through a separate path within the heat exchanger. The re-heated water then passes through heat exchanger 34 before circulating again through heater 34, thereby rejecting additional heat to intake air in building 14 35.

Amendments to the Drawings

The attached sheets of drawings include changes to Figures 1 and 2. These sheets replace the original sheets including Fig. 1 and 2.

In Figure 1, several erroneously omitted reference numerals have been included. Additionally, a short section of line has been removed, as indicated on the annotated sheet.

In Figure 2, several erroneously omitted reference numerals have been included. Figure 2 has also been amended to include the label "FIG. 2."

Attachments: (2) Replacement Sheets
 (2) Annotated Sheets Showing Changes